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Rossier

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(54) **SUPPORT FOR TREATING MICROMECHANICAL COMPONENTS**

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G04D 3/00	(2006.01)
G04D 3/08	(2006.01)
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USPC 248/125.7, 131, 415; 211/70, 163, 71.01, 211/74–77
See application file for complete search history.

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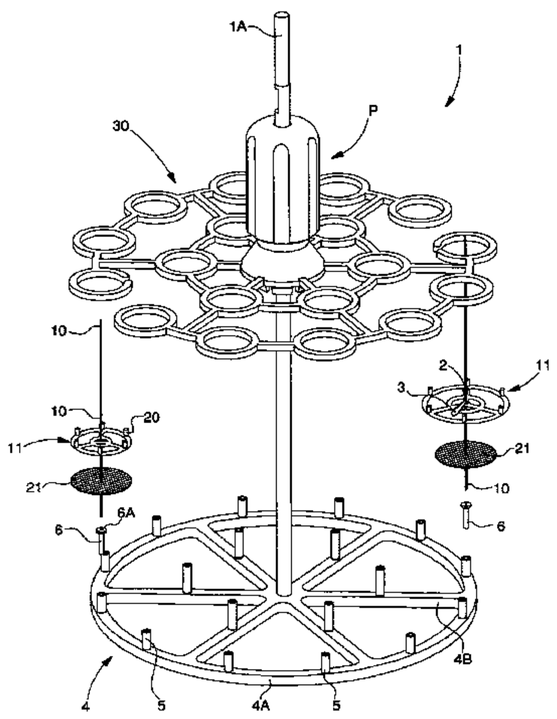
(57) **ABSTRACT**

A support for cleaning and/or galvanic deposition including a carrier structure including attachment points for watch hands each provided with a hole. The attachment points include at least one rigid pin, if necessary a conductive pin, onto which the hands are threaded via their hole and held apart from each other by a spacer.

15 Claims, 2 Drawing Sheets



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C25D 21/10	(2006.01)

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Fig. 1

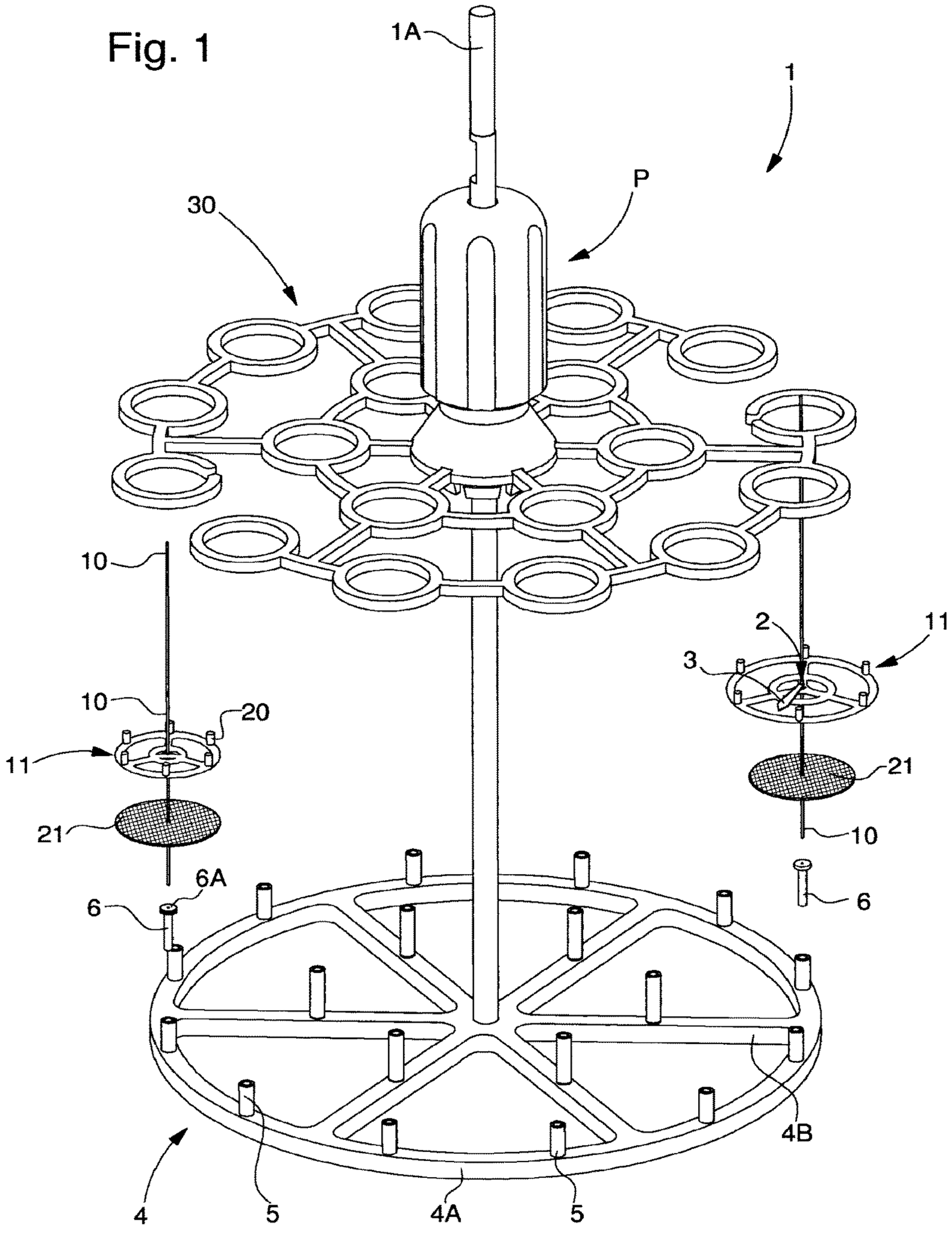


Fig. 2

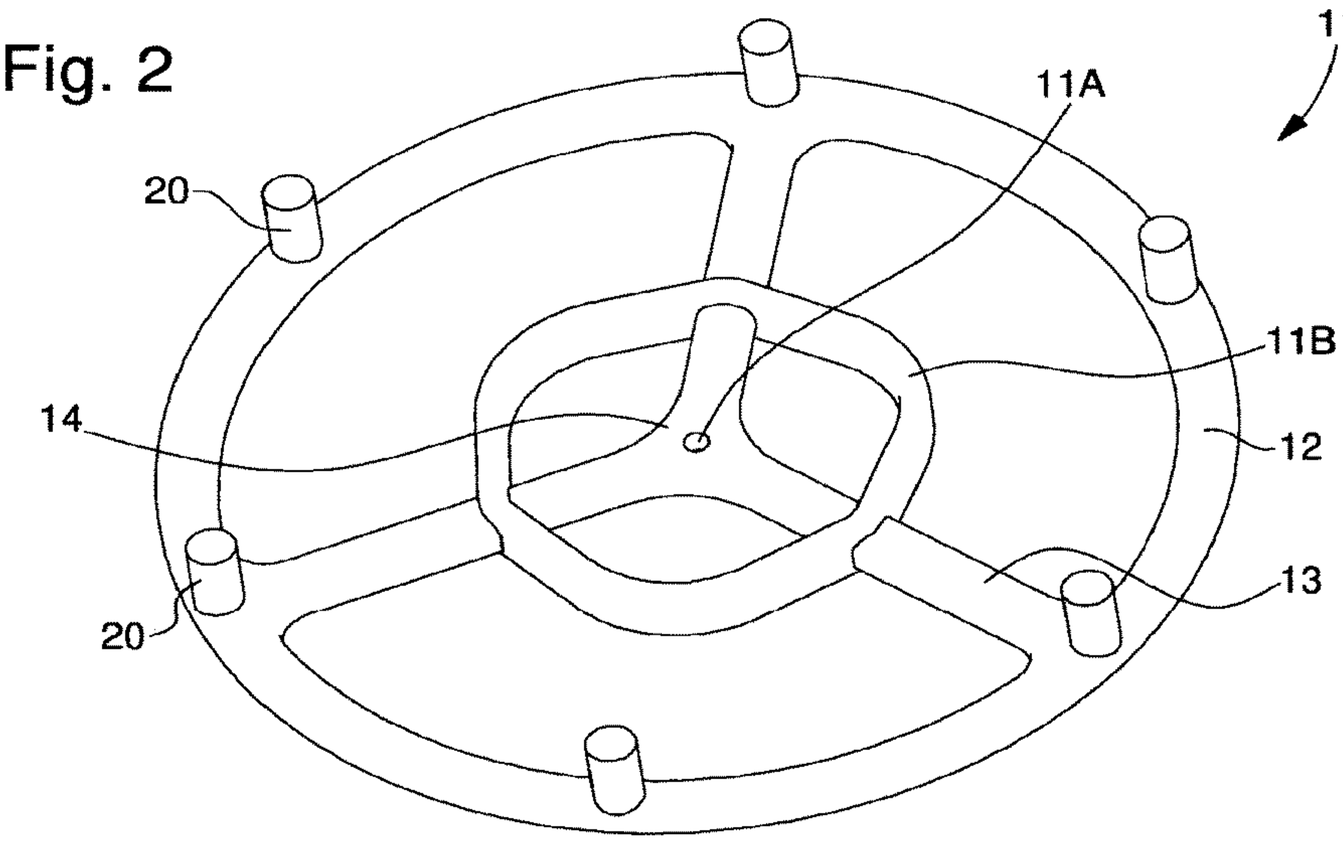


Fig. 2A

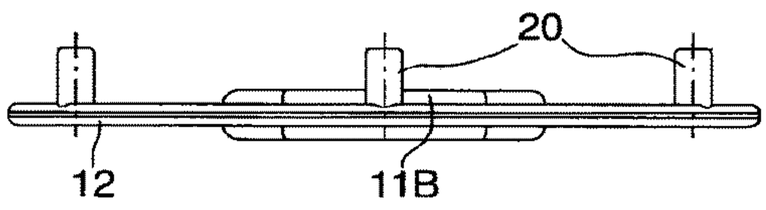
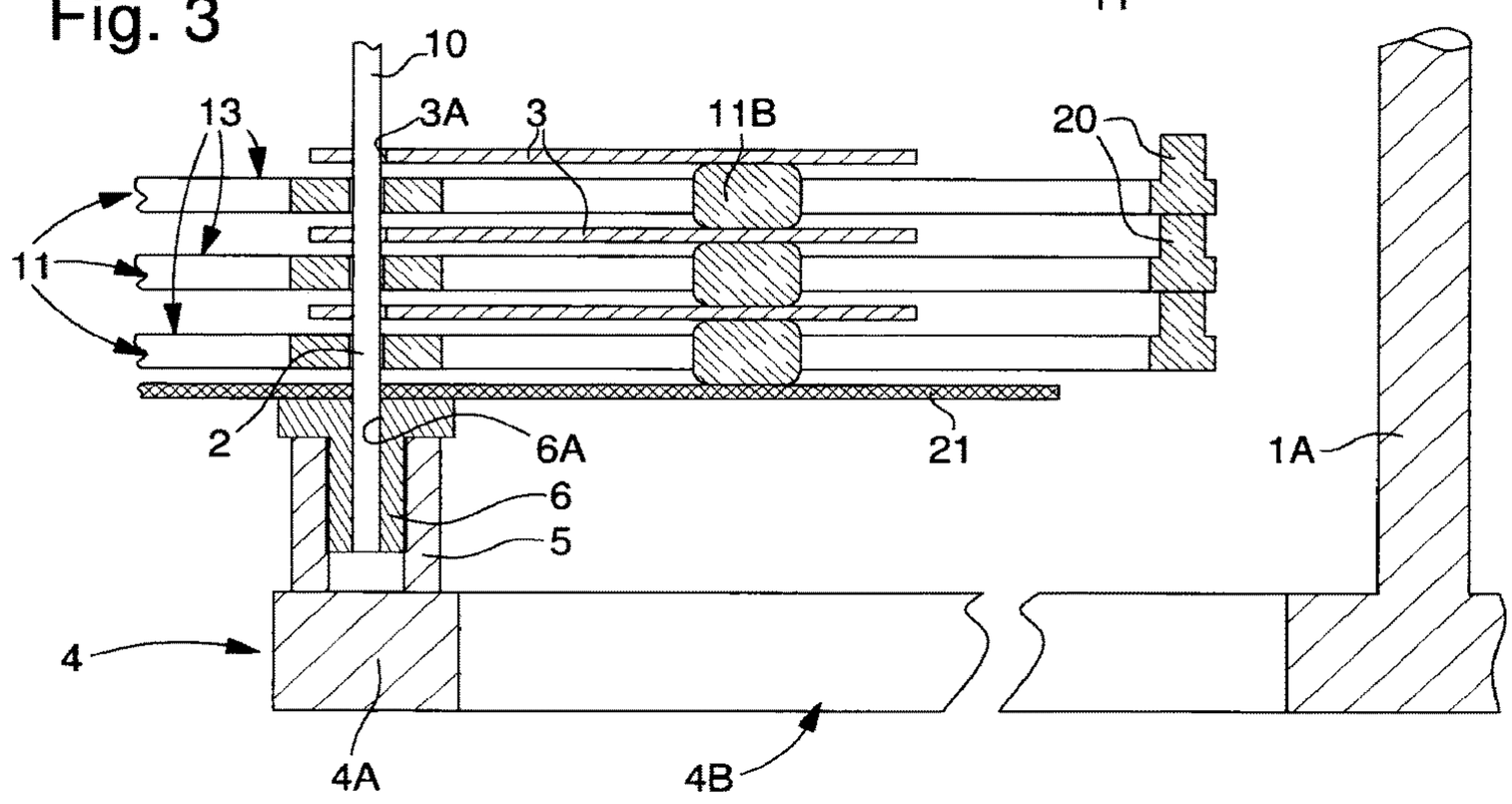


Fig. 3



SUPPORT FOR TREATING MICROMECHANICAL COMPONENTS

This is a National Phase application in the United States of International Patent Application PCT/EP2014/056038 filed on Mar. 26, 2014 which claims priority on European Patent Application No. 13166047.6 filed on Apr. 30, 2013. The entire disclosures of the above patent applications are hereby incorporated by reference.

FIELD OF THE INVENTION

The invention relates to a support for the treatment of micromechanical components, for example watch hands. In particular, the invention concerns a support to perform cleaning and/or galvanic deposition on micromechanical components and notably a support of this type for performing galvanic deposition surface treatments on micromechanical components including a through orifice or hole such as watch hands or similar.

BACKGROUND OF THE INVENTION

Like many industrial micromechanical components, after being cut from a body of material, watch hands are cleaned and treated by galvanic deposition in an electrolyte bath so as to coat the hands with a thin coating, for example a gold layer to protect them from oxidation and to give them a colour providing an attractive appearance.

Galvanic deposition is a well known technique which consists in using a continuous electrical current to deposit a metal material on the surface of a conductive part, the metal being initially in the form of cations in solution in a solvent. The component to be treated must thus be excited.

To date, in order to clean or treat watch hands by galvanic deposition, the hands are placed in batches in a basket or on a multi-hooked support called a "bouclard" which is in turn placed in a cleaning bath or in the case of galvanic deposition, in a galvanic bath for a determined period of time depending on the desired thickness of deposition. In the case of galvanic deposition, the basket is of course electrically conductive. The basket is regularly shaken during the operation for improved cleaning and, in the case of galvanic deposition, to prevent adhesion of the hands by the creation of a bridge of material or coating defects caused by overlapping.

Unfortunately, with this method scratches occur causing a high scrap rate.

SUMMARY OF THE INVENTION

It is an object of the invention to propose a solution for improving the cleaning and/or quality of galvanic deposition.

The invention therefore concerns a support for treating micromechanical components particularly for cleaning and/or galvanic deposition, formed of a carrier structure having attachment points for the micromechanical components to be treated, the components each including at least one hole or through orifice, said support being characterized in that the attachment points are formed by at least one rigid pin onto which the micromechanical components are threaded via their holes and are held apart from each other by a spacer means.

According to a preferred embodiment, the spacer means comprises spacers made of material which may be electrically insulating, having a central through hole for the passage of the rigid pin and each spacer has a support track remote from the central hole on which the micromechanical component, typically the hand, rests.

Preferably, the track is defined by the trajectory, over an angular amplitude of 360°, of the end of a spoke whose length varies according to its angular position.

Advantageously, the spacer means is made of electrically insulating material and takes the form of a ring connected by branches to a central portion provided with a pierced hole for engaging the pin therein and the branches carry the track on which the micromechanical component rests.

According to a feature of the invention, the ring of the spacer means includes studs.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be understood with the aid of the following description given by way of example with reference to the drawing which shows:

FIG. **1**: an exploded view of a support for galvanic deposition;

FIGS. **2** and **2**A: respectively perspective and side views of a spacer means; and

FIG. **3**: partial cross-section of a support according to the invention in a simplified version.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the drawing, a support **1** is shown for performing cleaning and/or galvanic deposition on micromechanical components. In the example below, the micromechanical components are watch hands, but it is of course clear that the support of the invention could be used with any other micromechanical component including an orifice or a through hole. This device, also called a "bouclard", loaded with components to be treated, is intended to be dipped into a cleaning and/or electrolyte bath and forms a cathode which cooperates with an anode to form a deposition on the surface of said components, typically a gold or rhodium or similar deposition.

The cleaning and/or galvanic deposition support is formed of a carrier structure **1** having attachment points **2** for watch hands **3** each provided with a hole **3**A.

Hole **3**A of the hand is used for mounting the hand on the drive outputs of the watch movement through the watch dial.

This support **1** conveys electric current and therefore has a current conductive element.

Advantageously, attachment points **2** are formed by at least one rigid conductive pin or rod **10** on which the hands are stacked via their hole **3**A and held apart from each other by spacer means **11**. The hands are mounted to rotate freely on pin **10** but the operating play is small since there must be a sufficient electrical contact between hand **3** and pin **10**. This contact is preferably permanent to obtain a uniform deposition on the surface of the hands. The spacer means is preferably free to rotate relative to pin **10**.

Conductive pins **10**, for example made of steel, are preferably coated with a gold layer to improve the electrical contact with the holes **3**A in the hands. Typically, pins **10** have a diameter of around 0.5 mm. It is important for the pins to be sufficiently rigid to withstand the rotations of the support without deformation during the deposition, rinsing and drying operations respectively performed on the components to be treated.

Support **1** includes a pierced plate **4** carried by a central shaft **1**A for driving the plate in rotation and pins **10** are remote from said pivot shaft.

Pierced plate **4** has a base **5** intended to receive pins **10** at least indirectly, for example via an intermediate part **6**, formed in the illustrated example by a shouldered tube inserted into the bases. This makes it possible to regularly change pins **10**, which will be coated with deposition during the galvanic deposition operation. An electrically conductive connection is of course provided between pins **10** and central shaft **1**A.

In the illustrated example, plate **4** is of generally circular shape. Pierced plate **4** takes the form of a hoop **4**A connected to pivot shaft **1**A by spokes **4**B like the rim of a spoked bicycle wheel. Here the support has six spokes.

Bases **5** are carried by the spokes and/or the hoop. Each base is hollow with a conductive internal surface which is intended to receive the bottom of pin **10** or of intermediate part **6** which then houses the bottom of pin **10**. The height of the base is around twice the thickness of hoop **4**A here.

Structure **1** including the central shaft, plate **4**, the bases, intermediate parts and pins are made of electrically conductive material, the current originating from shaft **1**A fixed to a current source belonging to the galvanic deposition machine.

In an advantageous embodiment, spacer means **11** comprises spacers made of electrically insulating material having a central hole **11**A for the passage of rigid pin **10** and each spacer has a support track **11**B which is remote from central hole **11**A and on which the hand rests. The only function of this track **11**B is to support the hand at a point remote from the hole of said hand. The hand is thus supported in the hole and on track **11**B.

Preferably, track **11**B is defined by the trajectory, over an angular amplitude of 360°, of the end of the spoke whose length varies according to its angular position. Thus, the track will be closer to or further from the pin such that the track does not describe a circle of constant radius. The desired result will be understood below.

During the rotation of support **1** in the bath, the hand must, simply due to gravity, travel over track **11**B of the spacer and there are two solutions to achieve this.

In one embodiment, pins **10** are parallel to the general pivot shaft **1**A, but during assembly in the electrolytic bath, said general pivot shaft is mounted in an inclined manner relative to the vertical, so that during rotation of the support about its shaft **1**A, the hand travels along track **11**B with a contact area that moves, which improves the uniformity of deposition. If the track were circular, the resting point of the hand on the track would always be the same and due to this contact, there would be no deposition in this area.

In an alternative embodiment, pins **10** are inclined relative to the central pivot shaft **1**A of the support which is held vertical in the electrolytic bath.

Spacer means **11**, which is made of electrically insulating material, takes the form of a ring **12** connected by branches **13** to a central portion **14**, which is provided with a pierced hole for engaging a pin **10** therein and the branches carry track **11**B which is not conductive. Typically, these rings **12** may be made of polyamide. It will also be noted that track **11**B is raised relative to branches **13**.

Ring **12** of the spacer means carries, on one surface thereof, studs **20** perpendicular to the plane of the ring, studs **20** acting as support for the spacer means located above. Six regularly distributed studs are shown here.

Branches **13** carry track **11**B sideways, and said track is positioned above the level of the branches.

At the bottom of the stack of spacer means **11** there is placed a washer **21**, which is called a stabilizer washer, and is made of electrically insulating material and pierced.

Stabilizer washer **21** prevents spacer means **11** from being placed in a skewed position. This is a disc with a holed or meshed surface.

The washer is supported on intermediate part **6** which is used for mounting the pin on the base. This intermediate part has an enlarged head **6**A.

The stacks of spacer means are held in place by a pierced cover **30** which will, for example, be fixed to the general pivot shaft **1**A by a securing means such as a clamp P.

In the diagram, cover **30** is formed of circles connected to each other by longilineal elements. The centre of these circles coincides with the position of pins **10**.

The above description was made with reference to an application of a support to galvanic deposition on micromechanical components and in particular watch hands, but it is of course clear that this application is not limiting and that according to a variant this support may be used for cleaning micromechanical components, in this case hands. In that case, pins **10** are not necessarily made of electrically conductive material, and the spaces are not made of insulating material.

What is claimed is:

1. A support for treating micromechanical components, or for cleaning or galvanic deposition, comprising: a carrier structure including attachment points for the micromechanical components to be treated, the components each including at least one hole; wherein the attachment points include at least one rigid pin onto which the micromechanical components are threaded via a respective hole therein, the components being held apart from each other by a spacer element, wherein the spacer element includes spacers including a central through hole for passage of the rigid pin, and the spacer element further includes branches extending from a central portion including the central through hole, and wherein each spacer includes a support track which encloses the central through hole and is separated from the central through hole by the branches, the support track being thicker than the branches such that the micromechanical component rests on the support track.

2. The support for treating micromechanical components, or for cleaning or galvanic deposition according to claim **1**, wherein the support track is defined by a trajectory, over an angular amplitude of 3600, of an end of a spoke whose length varies according to angular position thereof.

3. The support for treating micromechanical components, or for cleaning or galvanic deposition according to claim **1**, wherein the spacer element includes a ring connected by the branches to the central portion including the central through hole for engagement of the at least one rigid pin.

4. The support for treating micromechanical components, or for cleaning or galvanic deposition according to claim **3**, wherein the ring of the spacer element includes studs.

5. The support for treating micromechanical components, or for cleaning or galvanic deposition according to claim **1**, wherein the at least one rigid pin is conductive.

6. The support for treating micromechanical components, or for cleaning or galvanic deposition according to claim **5**, wherein the spacers are made of electrically insulating material.

7. The support for treating micromechanical components, or for cleaning or galvanic deposition according to claim **5**, wherein the pin includes a gold coating.

8. The support for treating micromechanical components, or for cleaning or galvanic deposition according to claim **1**,

wherein the support includes a pierced plate carried by a pivot shaft to drive the plate in rotation.

9. The support for treating micromechanical components, or for cleaning or galvanic deposition according to claim **8**, wherein the pierced plate includes a hoop connected to the pivot shaft by spokes and the plate supports hollow bases configured to receive a bottom of the at least one rigid pin.

10. The support for treating micromechanical components, or for cleaning or galvanic deposition according to claim **1**, wherein the support includes an aerated cover.

11. An assembly comprising: a support including a plurality of micromechanical components, and the support including a carrier structure including attachment points for the micromechanical components to be treated, the components each including at least one hole, wherein the attachment points include at least one rigid pin onto which the micromechanical components are threaded via a respective hole therein, the components being held apart from each other by a spacer element, wherein the spacer element includes spacers including a central through hole for passage of the rigid pin, the spacer element further including branches extending from a central portion including the central through hole, wherein each spacer includes a support track which encloses the central through hole and is separated from the central through hole by the branches, the support track being thicker than the branches such that the micromechanical component rests on the support track, and wherein the micromechanical components are watch hands.

12. The support for treating micromechanical components, or for cleaning or galvanic deposition according to claim **8**, wherein the pierced plate includes a hoop connected to the pivot shaft by spokes and the plate supports hollow bases configured to receive a bottom of an intermediate part.

13. A support for treating micromechanical components, or for cleaning or galvanic deposition, comprising: a carrier structure including attachment points for the micromechanical components to be treated, the components each including at least one hole; wherein the attachment points include at least one rigid pin onto which the micromechanical components are threaded via a respective hole therein, the components being held apart from each other by a spacer element, wherein the spacer element includes spacers including a central through hole for passage of the rigid pin, wherein each spacer includes a support track which is remote from the central hole and on which the micromechanical component rests, wherein the spacer element includes a ring connected by branches to a central portion including a pierced hole for engagement of the rigid pin and the branches support the track, wherein the track is raised relative to the branches, and wherein the ring of the spacer element includes studs.

14. A support for treating micromechanical components, or for cleaning or galvanic deposition, comprising: a carrier structure including attachment points for the micromechanical components to be treated, the components each including at least one hole; wherein the attachment points include at least one rigid pin onto which the micromechanical components are threaded via a respective hole therein, the components being held apart from each other by a spacer element, wherein the spacer element includes spacers including a central through hole for passage of the rigid pin, and the spacer element further includes a support surface extending from a central portion including the central through hole, and wherein each spacer includes a support track which encloses the central through hole and is separated from the central through hole by the branches, the support track is thicker than the branches such that the micromechanical component rests on the support track.

15. The support for treating micromechanical components, or for cleaning or galvanic deposition according to claim **12**, wherein the plate carries hollow bases configured to receive a bottom of the at least one pin or of an intermediate part, the intermediate part includes an enlarged head abutting a stabilizer washer.

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